

THE WATERSHED

A. Physiography

The headwaters of the Jordan River originate in level to smoothly rolling outwash plains with gentle slopes and immature drainage. From its source the river drops rapidly into a broad deep valley, changing to swamp flatlands and lowlands. There are many beaver meadows throughout the middle reaches of the river system. Feeder streams in this area flow from hilly land with complex slopes of sand and gravel soils.

Elevation at the headwaters of the Jordan River is 1,190 feet above sea level; the mouth at Lake Charlevoix is at an elevation of 590 feet. A profile of the river shows that it drops approximately 125 feet per mile for the first few miles. The velocity of the river slows somewhat as it flows through the tamarack swamp flats of the middle reaches. The average drop for the upper two-thirds of the Jordan River is 25 feet per mile. From Graves Crossing downstream to the mouth, the stream descends at an average of five feet per mile.

B. Soils

Soils in this watershed tend to be sandy, acid and with low to medium fertility. The soil types in the upland areas consist of dry sands of low fertility and sandy loams with areas of reddish clay of medium fertility. Soil types along the Jordan River at its headwaters consist of dry sands, but after several miles, change to organic soils of peat and muck. Soil types along the river change to sandy loams shortly after the river enters Charlevoix County. A rough breakdown of the soil classes in the watershed is as follows:

Soil Classes in the Watershed

Dry sands (Wexford, Emmett, Kalkaska)	40%
Sandy loams (Emmett, Roselawn)	35%
Dry sand and light sandy loam (Kalkaska, Rubicon)	10%
Peat and muck (Rifle, Carbondale, Greenwood)	15%

These soils were created from relatively insoluble minerals.

Water moving rapidly through the soils, to the river, is thus incapable of dissolving great amounts of minerals. (The waters of the Jordan have, consequently, lower amounts of dissolved nutrients; algae and heavy aquatic vegetation are therefore not a problem.)

The exceptional capability of sandy soil to allow precipitation to infiltrate and percolate is well known. Sandy soils have 30-40 percent pore space; thus 30-40 percent of the volume of sand is good for water storage or percolation. Furthermore, sandy soils will give up 90-95 percent of the water retained in pore spaces to gravitational movement which create the numerous springs which feed high quality, cold water to the river.

C. Vegetation

Forest cover for most of the upland areas of the Jordan River watershed consists of northern hardwoods – hard and soft maple, elm, beech, yellow birch and basswood, with some cedar in the wetter areas. Streamside vegetation generally consists of tamarack, birch, aspen and tag alder in the upper third of the Jordan, but gradually changes to swamp conifers (cedar, balsam and spruce). Below Graves Crossing the forest cover is reduced to a strip of swamp conifers with an occasional woodlot on either side of the river. The following map provides a generalization of timber types found in the watershed.

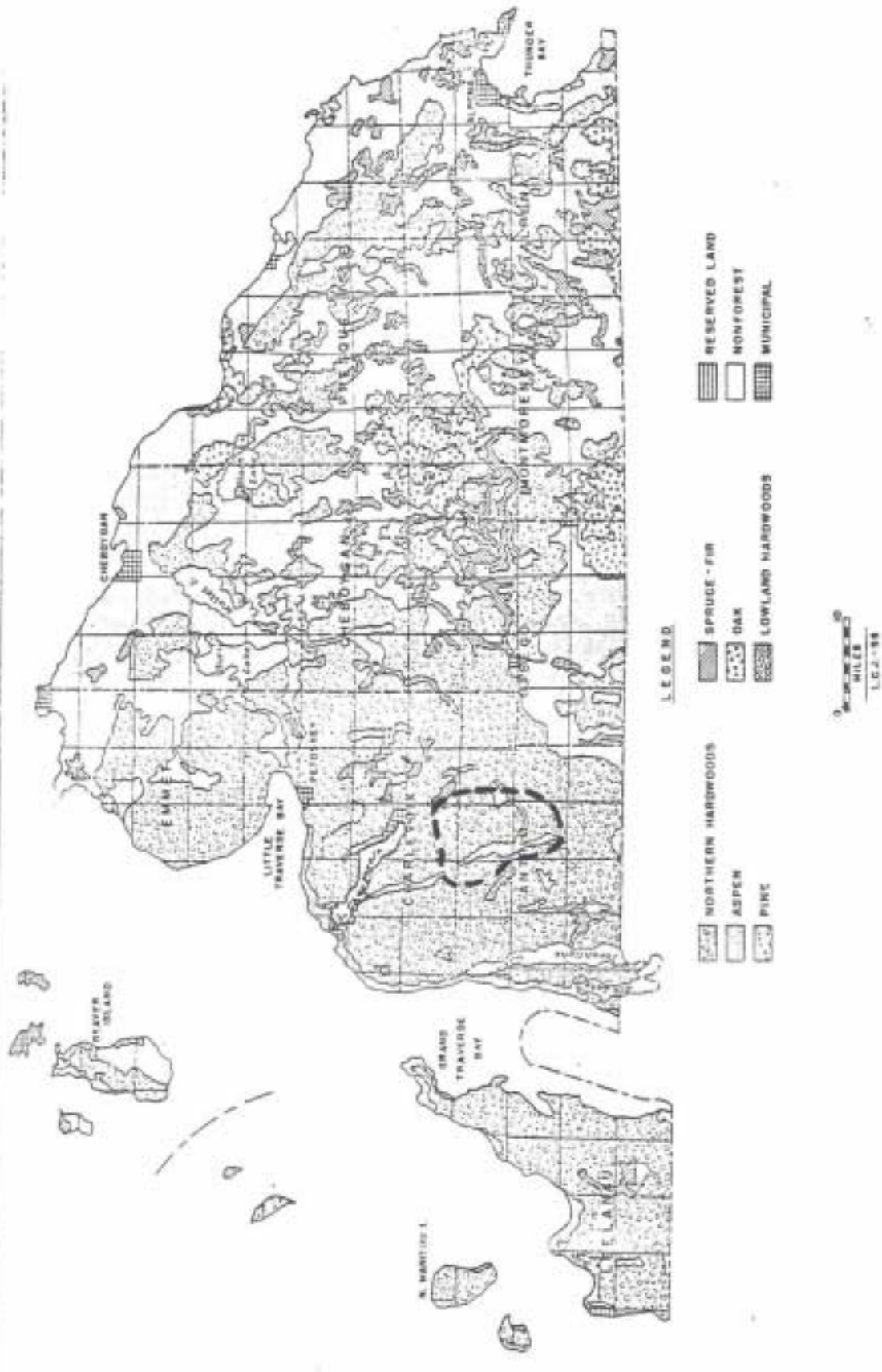


FIGURE 1. GENERALIZED FOREST COVER TYPES, NORTH TIP BLOCK, MICHIGAN, 1955.

D. Stream Characteristics

1) Water Quality:

The Michigan Water Resources Commission has established intrastate water quality standards and use designations¹ for the Jordan River. It is to be protected for recreation – total body contact (i.e., swimming); intolerant fish – cold water species; industrial water supply; agricultural and commercial water supply and other uses. Where water is to be protected for more than one use under these standards, the most restrictive individual standard of designated water use applies. Also, if existing water quality is superior to the designated use requirements, it must be maintained at that level until it has been adequately demonstrated to the Michigan Water Resources Commission that the change in quality does not or will not become injurious to the public health, safety, or welfare, or become injurious to any other uses being made of such waters.

Studies² conducted on the Jordan River by the Surface Water Quality staff, Department of Natural Resources, indicate that the quality of the waters within the Jordan River basin meet or exceed all criteria established by the water quality standards for the designated uses of the river.

The Jordan River National Fish Hatchery is the only known discharge to the Jordan River or its tributaries within the area considered for designation under the Natural Rivers Program.

Construction has been completed to control solid waste and associated nutrient discharges arising from the fish rearing operations.

Considerable quantities of sediment from feeder streams have been deposited in the river. This sediment while being carried downstream by the current reduces the clarity of the water and when settled out in slack areas covers up high quality fish habitat.

2) Streamflow:

Stream discharge data for the Jordan River is limited to the records obtained by U.S.G.S. at their “near East Jordan” gaging station, located in the NW ¼ of the NW ¼ of Section 7, T31N, R6W, Antrim County, 600 feet downstream from Webster Bridge, 4.2 miles south of East Jordan, and 4.5 miles upstream from its mouth. The drainage area at the gage is 67.6 square miles. The period of record available at this time are the water years 1967 through 1970, inclusive.

The maximum discharge recorded at this gage was 832 cfs. The minimum of 109 cfs, was the result of a freeze-up.

¹Use Designation Areas for Michigan Intrastate Water Quality Standards, published by Michigan Water Resources Commission, Surface Water Quality, Department of Environmental Quality, March 1969.

²Water Quality of Selected Lakes and Streams in the Grand Traverse Bay Region, published by the Michigan Water Resources Commission, Surface Water Quality, Department of Environmental Quality, March 1970.

A flow duration curve of average daily discharges, for the four years of record available, is attached. Such a curve indicates the percent of time during the period of record that specified discharges were equaled or exceeded.

The shape and slope of a flow duration curve is a key to the character of an individual river. The flow duration curve for the Jordan River has a relatively flat slope which would indicate that this river has a steady, uniform flow having neither extremely high or low flows. Normally a four-year record is not sufficient to define long term trends. However, in the case of the Jordan river with its uniform flow characteristics it is not likely that a flow duration curve based on a long term record would vary greatly from the one presented here, particularly at low discharges.

The Jordan River is typical of northern Michigan trout streams in that the permeable soils found within its watershed area conducive to ground water recharge, which results in high sustained base flows and cold water which is a necessary ingredient for top quality trout habitat.

A U.S. Geological Survey open file report "Hydrology and Recreation on the Coldwater Rivers of Michigan's Southern Peninsula", Hendrickson and Doonan, September 1971, compares streamflow characteristics and temperature data, and contains cross-sectional data of the lower peninsula's cold water rivers.

This report indicates that the Jordan River has the highest discharge yield per square mile of all southern Michigan cold water streams and that 90 percent of its discharge is derived from groundwater. The report also indicates that during the 1967-68 water year water temperatures at the U.S.G.S. gage near East Jordan varied from zero (0) and two (2) degrees centigrade in the winter and from 11 to 18 degrees centigrade in the summer.

3) Stream Bed Characteristics:

From the headwaters to its confluence with the Green River, the Jordan River ranges from 4 to 40 feet in width and 1 to 3 feet in depth. It is characterized by its low, bushy undercut banks and diverse stream channel with many stumps and fallen cedar trees which provide excellent fish cover but makes wading extremely difficult and canoeing virtually impossible. Bottom types are composed mostly of sand with areas of gravel and silt.

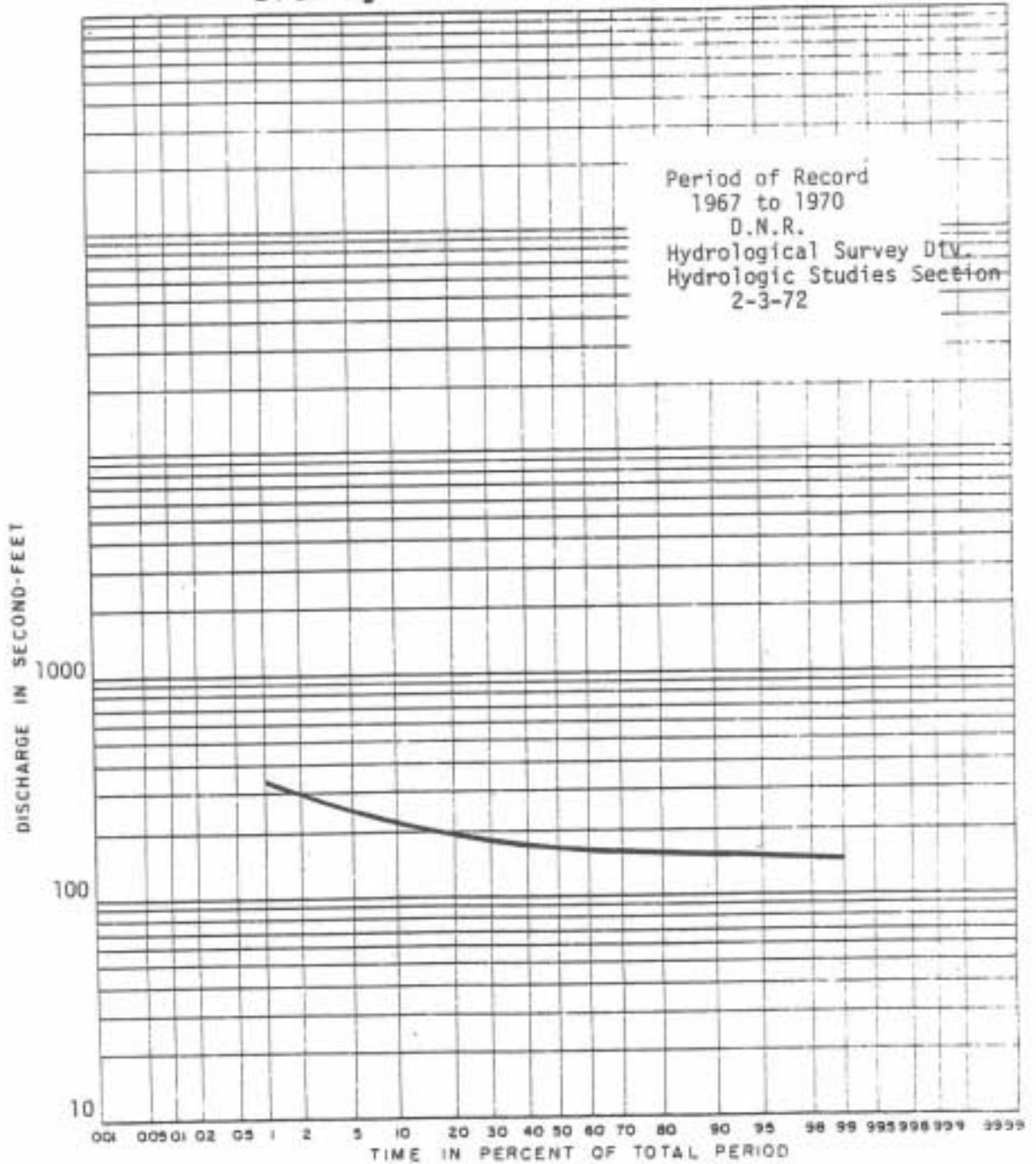
Between the Green River and Rogers Bridge the Jordan River averages 60 feet in width and 2 ½ feet in depth, but contains many holes four to six feet deep. The bottom is composed mostly of sand and gravel, except in slow pool areas where sand and silt are deposited. Deep pools, undercut banks, logjams and overhanging brush provide excellent cover and habitat for fish populations.

Below Rogers Road Bridge the river loses much of its gradient and becomes relatively slow moving, wide (150 feet) and deeper (3-6 feet). The bottom types consists mostly of sand and silt.

FLOW DURATION CURVE

JORDAN RIVER near EAST JORDAN

Drainage Area 67.6 square miles



Percent of Time Indicated, Discharge was Equalled or Exceeded

4) Stream Size:

The Jordan has many named and unnamed tributaries, but most are small (less than 1 ½ miles long), shallow and swift. The mainstream and its two major tributaries, Green River and Deer Creek, plus the several secondary tributaries total 102.0 miles of stream.

Stream	Linear Miles	Stream	Linear Miles
Mainstream	33.0	Landslide Creek	2.0
Bennett Creek	2.7	Cascade Creek	2.5
Todd Creek	1.5	Section Thirteen Creek	1.0
Bartholomew Creek	1.7	Six Tile Creek	.5
Severance Creek	1.7	Five Tile Creek	.5
Webster Creek	1.0	Unnamed Creeks	5.0
Lilak Creek	1.5	Birney Creek	1.0
Martin Creek	1.5	Jones Creek	1.0
Mill Creek	3.7	Deer Creek	10.0
Sutton Creek	2.2	Warner Creek	7.0
Kocker Creek	2.5	Collins Creek	3.0
Scott Creek	1.0	Eaton Creek	1.0
Tutstone Creek	1.0	Marrin Creek	1.5
Green River	6.0	Misc. Creeks	<u>3.0</u>
Stevens Creek	2.0		
		Total	102.0

Only three lakes, ranging in size from 2 to 500 acres, drain into the Jordan River system. Two of the lakes are exclusively in private ownership and Deer Lake has public access. The increasing number of private trout ponds may have a significant effect upon the thermal and nutrient qualities of some of the tributaries.

E. Hindrances and Hazards to Public Use

The entire Jordan River system is readily accessible for public use even though the lower portion traverses predominately private land. The twenty-mile reach between the headwaters and the junction with Green River is not canoeable and difficult to wade because of insufficient water depth and the presence of brush and logs. However, this material provides excellent fish cover, and the upper river area is considered a fisherman's paradise.

The lower portion downstream from Graves Crossing is canoeable, although the swiftness of the rapids as well as the presence of numerous logs and the winding nature of the river provide considerable challenge to the canoeing novice.

F. Climate and Seasons

The climate of the watershed is favorable for the summer recreationist with pleasant daytime temperatures and cool nights. The mean temperatures during the summer months average 5 to 10 degrees cooler than in southern lower Michigan. Precipitation is heaviest during the months of April through September. The heaviest rainfall is in September with an average of nearly four inches. Snowfall averages about 80 inches per year.

Prevailing westerly winds pickup moisture from Lake Michigan and as they rise over the hilly topography of the area, release substantial quantities of rain and snow. This precipitation is not spread evenly over the year, and periodic heavy rains wash some topsoil and debris into feeder streams originating in the hills. Careless removal of large areas of forest cover could result in increased amounts of sediments washing into the Jordan River and its tributaries.